QUALITY ASSURANCE--POLICY AND RELATED CONSIDERATIONS

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THESIS

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RELATED CONSIDERATIONS

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Quality Assurance -- Policy and Related Considerations

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ABSTRACT

The purpose of this paper is to examine DoD quality assurance policies and their application to Weapon System Acquisition Management. This paper is divided into six sections -- Elements of Policy, DoD Quality Assurance Policy, Quality Assurance During System Procurement, Areas Needing Improvement, Project Management, and Conclusions and Recommendations.

In general, quality assurance policies are consistent and well defined, but the procedures for implementing these policies need revision in the area of subcontract administration. Particular problems include the lack of standardized procedures for use by the Military Departments and DCAS, and the inability of contract administration offices at subcontract facilities to perform surveillance because of insufficient personnel.

The major deficiency in quality assurance procedures involves the Inspection Clause in ASPR which makes acceptance at the source final. The clause is not appropriate for current DoD policy of placing responsibility for quality on its contractors because government acceptance relieves the contractor of this responsibility.

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I. INTRODUCTION

The assignment of a Naval officer to an Acquisition billet is a challenge to his ability to discern Department of Defense policy with respect to his job and, having accomplished that, to perform in accordance with directives and regulations from several different sources. The purpose of this paper is to examine Department of Defense Quality Assurance policies and their application to Weapon Systems Aquisition Management. The objective is to enable Naval officers to gain appreciation for the Department of Defense Quality Assurance policies without reference and cross-reference to the Armed Services Procurement Regulations (ASPR), Navy and Department of Defense Regulations and Directives, Military Specifications, and various contract administration agencies' Handbook for Quality and Reliability Assurance.

The material in this paper is presented in six sections. The first section discusses elements of policy and the mechanics for effective policies.

Section two discusses current Department of Defense quality assurance policies.

Section three discusses quality assurance during system procurement. The procurement cycle is broken down into two phases. In the first phase cooperation between technical, quality assurance and contracting personnel is necessary in order to prepare for contract award. In the second phase the principal concerns are the methods and problems of

implementing the quality assurance provisions after the contract is signed -- both at the contractor's plant and at the subcontractor's plants. In each area, informational material is followed by the identification of apparent problems.

In section four areas are discussed in which quality assurance improvements are needed. Informational material is presented, the problem identified, and tentative solutions are offered.

In section five materials are presented which should be useful to the Project Manager during the administration of his quality assurance responsibilities.

Section six contains the recommendations and conclusions of this paper.

The material contained in this paper was obtained from several sources. Material from Defense Contract Administration Service (DCAS) was obtained by a visit to the Quality Assurance Representative (QAR) a Teledyne McCormich plant in Hollister, California and by telephone interviews with other DCAS personnel. Materials on quality assurance and contract administration were obtained by several visits to Lockheed Missile Space Company at Sunnyvale, California. Discussions were held both with contractor personnel and with personnel from the Naval Plant Representative Office (NAVPRO SUNNYVALE). Other materials were obtained from phone interviews with personnel in Naval Material Command and in the office of the Assistant Secretary of Defense for Installation and Logistics.

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III. ELEMENTS OF POLICY

A. GENERAL

Because the purpose of this paper is to examine Department of Defense Quality Assurance policies, a section devoted to the elements of policy is appropriate. Readers familiar with DoD policies and procedures may wish to proceed to Section V, Quality Assurance During System Procurement.

B. DEFINITION

A policy is a general statement of the intended behavior of organization. It provides guidance for planning and decision making within the framework of existing resources and regulation. The objective of a policy is to limit the scope within which decisions must be made. Thus policies are guides to thinking and decision making.

C. REQUIREMENTS FOR EFFECTIVE POLICIES

Policy exists to guide subordinate managers in the implementation of their responsibilities. Effective policies are required to prevent confusion and to ensure that subordinate managers understand what is expected in the way of decisions that contribute toward organizational objectives. Thus one way of achieving effective policies is to ensure that policies reflect the objectives and plans of the organization. A new concept or way of doing business can render a policy obsolete overnight.

A second method for obtaining effective policies is through consistency and flexible application. Consistency is best achieved through consolidation and presentation of related policies together so that the intent of the originator is better understood. The need for flexibility in the application of policies arises because of the complex nature of Weapon System Acquisition. Continued requests for exception indicate either the policy was not designed for current conditions or that the subordinate manager is too tightly restricted.

The third method for obtaining effective policies is perhaps the most important. A careful distinction should be made between policies, procedures, and rules. The correct separation is important for good planning, and delegation of authority. Policies are guides to thinking and decision making. Procedures are plans that establish a required method for handling specific activities or events. Rules are plans that require a specific action to be taken with respect to a specific situation.

Effective policies are important in terms of the achievement of organizational objectives. Ineffective policies create confusion and may prevent achievement of the organizational objective.

IV. DEPARTMENT OF DEFENSE QUALITY ASSURANCE POLICY

A. SOURCE

The primary source of policy guidance concerning Quality Assurance is the Assistant Secretary of Defense for Installations and Logistics (I&L). The primary implementing directive is Department of Defense Directive 4155.1 of February 9, 1972. Further policy direction is contained in the Armed Services Procurement Regulations (ASPR). A copy of this directive is provided in Appendix A.

DoD Directive 4155.1 of February 9, 1972 represents a consolidation of some twelve DoD Instructions issued as early as 1957. This consolidation reflecting the principle of consistency in establishing effective policies has clarified current DoD policies regarding Quality Assurance. This is a substantial change from the former maze of direction that existed in prior years.

DoD Directive 4155.1 provides for the review of Quality Assuranc policies by a DoD Quality Assurance Council composed of one General or Flag rank officer and one senior civilian from each Military Department and the Defense Supply Agency (DSA). The Council shall be chaired by a representative of the ASD (I&L) and will provide consultation and advice to the ASD (I&L) on quality assurance matters.

SECNAVINST 4355.14 of August 7, 1972 implements DoD Directive 4155.1 of February 9, 1972. The Chief of Naval Material is designated to ensure compliance with the provisions of DoD Directive 4155.1 and to

develop and issue supplemental policies, instructions, and criteria. Although a supplemental NAVMAT INSTRUCTION is under preparation, issuance is not expected before March 1973.

B. PURPOSE OF QUALITY ASSURANCE

1. Enforcement of Technical Criteria

The primary purpose of quality assurance as defined by DoD Directive 4155.1 is the enforcement of technical criteria and requirements governing all materials, data, supplies and services developed, procured, produced, stored, operated, maintained, overhauled, or disposed of, by, or for the Department of Defense. [Ref. 4]

2. The Functional Organization Responsibilities

The functional organization which creates technical criteria is responsible for the translation of functional requirements including reliability and maintainability into quantitative requirements that can be contractually specified and demonstrated.

C. DEPARTMENT OF DEFENSE QUALITY ASSURANCE POLICY

1. General

a. Objective Evidence Required

Determination that materials, data, supplies and services meet requirements shall be based on objective evidence, which may include direct product examination and test, review of procedures, processes, records and documentation. The results are retained for corrective active purposes. Where feasible, functional tests of the end product in a real

or simulated environment are required to confirm that performance and quality requirements are met.

b. Selection of Degree and Type

The degree and type of quality assurance provided during the life of the product is varied to assure mission responsiveness.

c. Defect Prevention

Defect Prevention requires timely and integrated planning, monitoring of appropriate procedures, systems and resources and the correction of causes of deficiencies.

d. Feedback

Feedback is the mechanism in a control system that enables the top management to assess the success or failure of policies. From this assessment management is able to take corrective action to achieve the desired results. Specifically ASD (I&L) has directed the Military Departments and DSA to establish an information system that will feedback quality information to activities responsible for development, procurement, and other management functions so that they can initiate action to correct or prevent quality deficiencies.

e. Civilian Personnel

The DoD-wide Civilian Career Program for Quality and Reliability Assurance to assure maximum employee efficiency and career development will be continued. A description of the technical training program is contained in DoD Manual 1430.10-M-2, "DoD-Wide Civilian Career Program for Quality and Reliability Assurance Personnel," February 3, 1970.

f. Audits

Quality audits of materials, data, supplies and services shall be conducted.

g. Calibration

The contractor shall establish and maintain a system for the calibration of all measuring and test equipment used in fulfillment of his contractual requirements. Measurement accuracies shall be traceable to U. S. National Standards maintained by the National Bureau of Standards.

2. Procurement

a. Contractor's Responsibilities

DoD Directive 4155.1 of February 9, 1972 [Ref. 4] defines contractor responsibility in the following manner: "Contractors are responsible for (a) controlling product quality, (b) offering to the government for acceptance only material, data, supplies and services that conform to contract requirements, and (c) when required, maintaining and furnishing substantiating evidence of this conformance."

b. Department of Defense Responsibilities

The Military Departments and DSA are responsible for ensuring that contracts specify the appropriate quality requirements. Assignment of contract administrative functions to ensure contractors comply with quality requirements shall be made in accordance with the Department of Defense Plant Cognizance Program.

c. Subcontracts

Government procurement quality assurance at the subcontractor plant shall be performed only when necessary to assist the contract administration office cognizant at the prime contractor's plant. These actions do not relieve the prime contractor of any of his responsibilities under the contract and do not establish any contractual relations between the Government and the subcontractor.

d. Armed Services Procurement Regulation

Procurement quality assurance policies contained in DoD 4155.1 are implemented by the Armed Services Procurement Regulations (ASPR).

3. Development (R & D)

a. Early Stages

Quality Assurance shall be considered early in the design stage to obtain maximum benefits with regards to tradeoffs of quality requirements for cost, schedule, and performance parameters.

b. Specifications

During the development of the specifications; standards, inspections, and tests shall be required to ensure the production process does not degrade system performance.

4. Standardized Procedures

Although quality assurance policy has been standardized, contract administration procedures have not been standardized. References 7 and 15 are but two of several procedures manuals used at the current

time by Naval activities. Although there is a real need for product standardization, previous attempts have failed to be accepted by the Military Departments and even by different organizations within each service. Currently DSA and the Military Departments are in the final stages of drafting a coordinated common procedural manual, DSA 8200.1 Series. This manual would greatly simplify contract administration and the understanding of contract administration within DoD.

One immediate consequence of a standard contract administration manual would be the ability to audit and evaluate the various contract administration agencies. The purpose of such an audit would be the same as any major operational inspection (Operating Readiness Inspection, Nuclear Technical Proficiency Inspection, Operation Reactors Safeguard Exam, etc.) and the effect would be to improve the quality of contract administration functions by enforcing standards procedures. Currently ASPR 3-801.5 [Ref. 2] provides for audits of contractors' implementation of quality assurance procedures but not of the contract administration itself. If implemented properly, audits of contract administration could improve their performance. Good ideas of better procedures could be transferred from one office to another and even from one Military Department to another through communication of audit board results and findings.

V. QUALITY ASSURANCE DURING SYSTEM PROCUREMENT

A. PROCUREMENT PLANNING FOR QUALITY ASSURANCE

1. Specification

In a formal sense, specifications are descriptions of the technical and other system requirements that establish the parameters of the design, performance, construction, and physical characteristics of the end product. When, because of insufficient time or knowledge, or because of the complexity of the product involved, it is impossible to prepare a formal specification, ASPR [Ref. 2] permits the use of a purchase description which defines the essential characteristics and functions of the system.

Complex military systems are generally produced under performance specifications, because it is not feasible to define anything more than the performance objectives and general characteristics of the desired work. Prior to the commencement of the production the contractor is required to develop design specifications and a data package to ensure that the required quality and performance of the system is not downgraded by the production process.

2. Technical/Contract Personnel Interface

The contracting officer who is charged by regulation with responsibilities for entering into contracts binding upon the government is the spokesman to Industry for the procurement team. Although the contracting officer has the authority to represent the Government in the

execution of contracts, to authorize and negotiate change orders, to grant time extensions, to accept items, to authorize payment, to issue termination for default or convenience of the Government, and to negotiate settlements following convenience terminations, the contracting officer requires the assistance of many personnel (lawyers, technical, quality assurance, and Small Business specialists, etc.) to successfully complete contract arrangements.

The difficulty in the team approach may be parochial in nature. The technical specialist views the contracting officer and ASPR as an impediment to progress whereas the contracting officer views the technical specialists as emphasizing technical quality to the exclusion of everything else -- contractor past performance history, schedule, lead times, competition, etc. In reality technical and contracting personnel must work together as a team to most efficiently discharge their procurement responsibilities. Cross training courses such as the Harbridge House, Defense Procurement Management for Technical Personnel, have improved the technical/contracting personnel interface communications problem.

a. Technical Requirement

Requirements for services or supplies are originated by the users. A procurement request (PR) is prepared and forwarded to the Contracting Officer. It is important for the PR to present all the information necessary to contract for the required services or supplies. Incomplete or inaccurately documented requests must be clarified prior to

contractual action. In some cases the correction of errors may seriously delay timely contractual coverage or result in the procurement of unwanted non-conforming supplies.

b. Quality Assurance

The PR must contain all the quality and reliability requirements established for the procurement. The originator is responsible for reviewing these requirements as early in the preparation of the PR as possible. This responsibility is normally exercised by the selection of the appropriate ASPR clause or by citing the appropriate item specification in the solicitation. The selection of the quality assurance requirements involves important quality decisions which affect contract cost, schedule, and performance.

The quality requirements selected in the solicitation determine the scope of the contract administration office quality assurance effort. For example, if the contract quality requirements for a critical or highly complex item are not as demanding as the item requires, the quality assurance representative (QAR) cannot insist on more rigid quality controls considered necessary without obtaining a change order to the contract from the procurement contracting officer.

The Joint Commanders' Panel on Contract Administration [Ref. 10] in a report on quality assurance dated 24 March 1971 found the "Contract requirements are frequently established with little or no input from the quality assurance personnel and technical data packages do not receive adequate pre-procurement technical reviews by quality

assurance personnel." The panel's report emphasized the importance of the quality assurance input by recommending a change in the organizational location of the quality assurance function to assure a quality input into the procurement process. This would include review of quality assurance requirements to be included in solicitations and a review of contractual technical data packages.

c. Contract Type

The contract type is one of the most important decisions for the Contracting Officer and Project Manager. The fixed price type contract motivates the contractor to produce the end item at the least possible cost and is the desired type of contract where a good technical data package exists. However, in a developmental type situation where the Government desires the right to exercise technical direction, a cost type contract is more appropriate. Thus the Project Manager should seek the advice of the lawyer, contracting officer, and technical experts in selecting the type of contract most appropriate for the requirements of the program including the degree of technical and financial risk, both to the Government and contractor. More specific guidance is provided by SECNAV INST 5000.1 [Ref. 21] which states:

> Contract type shall be consistent with all program characteristics including risk. It is not possible to determine the precise production cost of a new complex defense system before it is developed; therefore such systems will not be procured using the total package procurement concept or options that are contractually priced in the development contract. Cost type prime and subcontracts are preferred where substantial development effort is involved. Letter contracts shall be minimized. When risk is

reduced to the extent that realistic pricing can occur, fixed-price type contracts should be issued. Changes shall be limited to those that are necessary or offer significant benefits to DoD. Where change orders are necessary, they shall be contractually priced or subject to an established ceiling before authorization, except in patently impractical cases.

3. Primes Response/Proposal

When the Contracting Officer understands the requirements of the PR and has determined the appropriate method of procurement, the next step in the contracting process is to establish a definitive list of sources from which bids, or proposals, should be solicited. The development of this list requires inputs from contracting, engineering, and technical personnel. From this list of sources the Contracting Officer prepares a formal solicitation package which is mailed to the firms on the source list. The solicitation package contains the Invitation for Bid (IFB) or the Request for Proposal (RFP), the schedule, the pertinent General Provisions for the type of Contract anticipated, any other terms or conditions pertinent to the procurement or that will be used to evaluate offers received, pertinent specifications, drawing and other technical data, and cost and price analysis forms for negotiated procurements.

Upon receipt and evaluation of the solicitation package a firm that desires to submit a bid breaks the solicitation down into manageable work packages or elements which can be priced out. One breakdown is in the quality assurance area. The prime contractor takes the quality requirements and breaks it down into a program plan. This plan is priced out and becomes part of the company's proposal which is submitted to the Government for evaluation.

In the case of an Invitation for Bid, the firm with the lowest responsive, responsible bid, price and other facts considered, wins the contract. In the case of a negotiated procurement the firm who submits the best proposal becomes the prime contractor.

4. Source Selection

Meaningful source selection requires thorough evaluation and comparison of all relevant factors, both technical and nontechnical. This evaluation can only be achieved through teamwork between technical and contracting personnel. After the proposals have been evaluated, the results must be analyzed together with the business qualifications of the sources in order to determine which offer is most acceptable to the government, taking into consideration all pertinent factors (technical merits, price, planned deliveries, etc.) and whether the contractor submitting the most acceptable offer is fully qualified in all respects (technically, financially, productively, etc.) to perform satisfactorily under the contract.

5. Negotiation

In a competitive situation the Contracting Officer may accept the offer made in response to the Request for Proposal if the price is deemed to be fair and reasonable. However, in complex procurements where there is a question to the reasonableness of the price, or there are misunderstandings, or there is only one source, then the Contracting Officer will conduct negotiations. An example of a misunderstanding might be in the extent of quality assurance effort required to meet the

requirements of the contract. Upon completion of the negotiations a contract is prepared and signed.

B. CONTRACT ADMINISTRATION--QUALITY ASSURANCE AT THE PLANT LEVEL

1. General

a. Post Award Conference

ASPR 1-1803.4 [Ref. 2] states: "It is essential that all parties involved in the execution, administration, and performance of a government contract have a clear and mutual understanding of the scope of the contract, the technical requirements ..." The method used on a selective basis by Contract Administration Offices is to conduct a post award conference with the contractor to discuss and reach a common understanding of the technical requirements. The interaction between technical, contract administration and contractor personnel results in an improved knowledge of the requirements. Poorly defined items are interpreted for the contractor and the Contract Administration Organization. The result is to prevent action that could result in delays or cost growth.

b. Procedures Review

Procedures review is applicable when the contract requires documented quality or inspection procedures. The QAR reviews these procedures prior to production and at periodic intervals to ensure compliance with contract terms.

c. Procedures Evaluation

Procedures evaluation provides for the continuing assessment of the contractor's compliance with his previously reviewed and documented procedures.

d. Product Verification Inspection

Product verification inspection provides for a degree of independent physical product inspection by the QAR. The intensity of the product inspection depends on the contractor's quality control history.

e. Contractor Decision Verification

The contractor decision verification concept is used to assess the validity of the contractor's inspection decisions. A random sample is selected from items previously approved by the contractor's inspectors for the purpose of assuring that the contractor's quality program or inspection system satisfactorily controls the quality of the product. Currently the Military Departments and the Defense Supply Agency (DSA) are in the final stages of drafting a coordinated procedural manual, DSA 8200.1 Series, Guidelines for Contract Administration, which may delete this concept.

f. Corrective Action

Five levels of corrective action measures are provided to assure that the contractor corrects the cause of deficiencies discovered during contract administration. These measures increase in severity from immediate correction to recommendations to the administrative contracting officer that acceptance be withheld pending evidence that the contractor has taken corrective action.

g. Quality Assurance Representative

Interviews were conducted with quality assurance personnel from the Defense Contract Audit Service (DCAS), an ordinance Naval Plant Representative Officer (NAVPRO), and with a large government contractor. Interview results indicated that without specific commodity guidance the successful implementation of product quality assurance procedures (PQAP) is dependent upon the ability of the QAR's to exercise technical judgements and system approval. The quality assurance concept requires a skilled quality manager who has considerable product experience. The need for increased training of quality assurance personnel has been recognized in several Department of Defense sponsored studies [Refs. 3, 9, 10] and a DoD career training program has been established to remedy some of these deficiencies. The current DoD program is slanted toward Technician level training and does not include professional such as engineers and statisticians. A program for professional personnel must be implemented to enable engineers and statisticians to keep abreast of new technologies with applications in Quality Assurance.

The most serious area of inconsistency is in the evaluation and approval of a contractor's quality program. Reference 11 grants the QAR the responsibility for determining that contractual requirements have, in fact, been complied with prior to acceptance of the product. In practice the quality of the approved system is directly dependent on the skill and knowledge of the QAR. As a result, contractor implementation of MILSTD 9858A, Quality Program Requirements, depends on the QAR.

Specific procedures may vary from plant to plant within the same firm, often to the disadvantage of the Government. There is a need to standardize product assurance quality procedures to ensure the government gets full benefit from product assurance dollars. An example of inconsistency in the area of product inspection cited in Ref. 10 is as follows: "Under current PQAP, the degree of government product inspection is largely within the province of QAR judgements and it is likely that different QAR's would each conduct a different degree of product inspection for the same product, at the same plant. A more disciplined approach could lead to an even-handed program, where management could more readily assess QAR performance at plant level."

2. Quality Assurance -- Subcontract Level

a. Policy

Government policy is that the contractor is responsible to the Government for compliance with total contract requirements including that of assuring the quality of subcontract or vendor parts. More specifically the mandatory contractor Responsibility For Inspection (1968 SEP) clause contained in the ASPR [Ref. 2] states:

> Notwithstanding the requirements for any Government inspection and test contained in the specification applicable to the contract, except where specialized inspections and tests are specified for performance solely by the Government, the Contractor shall perform or have performed the inspections and tests required to substantiate that the supplies and services provided under the contract requirements listed herein, including if applicable the technical requirements for the manufactorers' part number specified herein.

Government procurement quality assurance is performed at subcontractor plants only at the request of the contract administration office cognizant at the prime contractor's plant. These actions do not relieve the prime contractor of any of his responsibilities under the contract and do not establish any contractual relationship between the Government and the subcontractor. ASPR 14-305.2 [Ref. 2] lists the prerequisite conditions for delegation of contract administration responsibilities. The essential conditions are listed below:

(1) Application of Inspection System or Quality Program. When a contract requires a contractor to establish or maintain an inspection system (MIL-I-45208A) or a quality program (MIL-Q-9858A), ASPR allows Government procurement quality assurance actions to be performed at the source.

(2) Uneconomical Disassembly or Destructive Testing. ASPR requires Government procurement quality assurance actions to be performed at the source when performance of such actions at any other point would require uneconomical disassembly or destructive testing.

(3) Loss to Government. ASPR requires Government procurement quality assurance actions to be performed at the source when considerable loss to the Government would result from the manufacture and shipment of unacceptable supplies or from the delay in making necessary corrections.

(4) Special Instruments, Gauges, or Facilities Required. ASPR requires Government procurement quality assurance actions to be

performed at the source when special instruments, gauges, or facilities required for the performance of such actions are available only at the source.

(5) Replacement of Costly Packing. ASPR requires Government procurement quality assurance to be performed at the source when performance of such actions at any other point would destroy or require the replacement of costly special packing and packaging.

(6) Essential Nature. ASPR requires Government procurement quality assurance actions to be performed at the source when it is essential during performance.

(7) Overseas Embarkation. ASPR requires Government procurement quality assurance actions to be performed at the source when supplies are destined for points of embarkation for overseas shipment.

(8) Otherwise in Best Interest. ASPR requires Government procurement quality assurance actions to be performed at the source when it is otherwise determined to be in the best interest of the Government.

b. Subcontract Quality Assurance Problems

(1) Prime Contractor Control. Although the contractor has always been responsible to the Government for control of product quality, in practice many contractors have relied heavily on government inspection at subcontract facilities for assurance of quality of subcontract or vendor parts. This is particularly true for parts procured under a military specification because the specification is written and

controlled by the Government. In addition to performing required part qualification test, section 4 of the specifications generally requires that the Government perform the inspection. In addition to duplicating Government facilities and functions, the maintenance of adequate controls over Mil Spec parts is expensive.

During the last five years the declining Operating and Maintenance Funds (O&M) has forced a reduction in the number of government inspectors available for subcontract inspection. Therefore it is the policy of the Government to require the contractor to assume complete responsibility for the quality of parts produced by his vendors and subcontractors. The government's withdrawal from subcontract inspection has left a void that many contractors are reluctant to fill, especially in competitive type procurement where award is made on the basis of price alone. Even in negotiated type procurement the number of dollars a contractor is willing to expend on subcontract quality assurance effort depends to a large extent on what the negotiator and the procurement contracting officer are willing to allow. Thus the only situation in which a contractor is willing to do an adequate job in subcontract quality assurance effort is in the sole source type procurement where the requiring activity demands and is willing to pay for the quality assurance effort. The driving factor in all these situations is the competitive situation of the firm with respect to its competitors. It is unrealistic for the Government to expect to be able to shift the responsibilities for subcontract quality assurance activities to the contractor without a substantial increase in price.

The consequences of effectively implementing this policy are immediately obvious. In a hypothetical case of two contractors procuring a common aircraft engine, each contractor is required to ensure that adequate process controls are applied to the subcontractor's production line. Assuming agreement can be reached over what constitutes "adequate controls," each contractor must establish and maintain quality assurance control personnel at the contractor's facility essentially duplicating each other's quality assurance effort. Essentially, the Government is paying each contractor to duplicate the quality assurance effort at this subcontractor's plant. This duplication and waste of product assurance dollars would be complicated by lack of a standardized product assurance quality procedure (PAQP).

The establishment of a Transfer Fund similar in concept to the Naval Industrial Fund has been proposed in Refs. 3 and 10 as a solution to the problem of declining O&M funds on the reduction of numbers of Government Inspectors. Insufficient contract administration personnel has increased the cost of System Acquisition because of the necessity for paying the contractor for quality control formerly performed by the Government. Another problem is in the difficulties in assignment of contract administration tasks to contract administration offices cognizant at the subcontractor plant because of insufficient personnel. The establishment of a Transfer Payment system similar to the Industrial Stock Fund would allow the Project Manager who requires contract administration performed at a subcontractor's plant in accordance

with the ASPR guidelines to contract and pay the cognizant contract administration office for the desired services. This in turn would allow the contract administration office to acquire the required personnel to perform the requirement. This proposal has been discussed by ASD (I&L) and studied by his quality assurance policy board but the results have not been released.

Another approach to improving vendor control is being developed by the Vendor-Vendee Technical Committee of the American Society for Quality Control (ASQC). The approach of the committee is analogous to the concept for the Underwriters Laboratories seal for electrical apparatus and components. The ASQC program contemplates a vendor fee supported system of surveys of in-house quality programs, and the award of a seal with periodic resurvey. The potential of this program for reducing government and contractor quality assurance costs warrants government support.

(2) Project Manager Control. The Project Manager makes many visits to contractor and subcontractor facilities to assess progress. One recurring problem is to ensure the quality assurance provisions of the contract are met when Government contract administration personnel at the subcontractor plants are unable to perform surveillance because they do not have adequate training and experience or do not have sufficient personnel. When problems develop the Project Manager asks the contractor to resolve the issue. If the contractor is unable to correct the problem, the Project Manager is not able to force compliance

without a contract modification. Almost any other action can be construed as a constructive change order which will result in a claim against the Government.

VI. QUALITY ASSURANCE--AREAS NEEDING IMPROVEMENT

A. ASPR - REGULATORY EFFECT

When a problem arises or incident occurs in the procurement cycle, the reaction is to establish a regulation which will prevent this problem from ever occurring again. DoD Contract Management Conference, IMPACT '73, [Ref. 3] in discussing the regulatory effect of ASPR observed, "It should be recognized, however, that with each regulation that is incorporated into ASPR a 'freedom' is given up. ASPR more frequently seems to be the reason for saying 'no' rather than the regulatory document which supports 'getting the job done' ."

Before considering a new regulation, each incident should be carefully analyzed to determine why the situation occurred. For example, the problem for the occurrence might be attributed to insufficient or improper training, supervision, or inexperience which would indicate a different solution than that required by change in a public law. The ASPR might better be limited to broad guidance rather than providing specific policy procedures.

B. TECHNICAL DATA DEFICIENCIES

The Technical Data Package (TDP) is the method used in the procurement process to convey DoD technical requirements to the contractor. The TDP must transmit to competing bidders the technical knowhow required to produce the end product. An inadequate TDP requires the successful

contractor to perform Research and Development (R&D) to once again resolve the technical problem previously overcome. The first Joint Commanders Panel [Ref. 10] in their discussion on deficient TDP's stated:

> From a practical standpoint, transfer of technology through specifications, standards and drawings is a most difficult, and at times, an almost impossible task. Obviously, when technology is complex and pushing the state-of-the-art, it becomes increasingly difficult to expect the documentation alone can convey the item requirement. Nevertheless, in DoD procurement, the Technical Data Package is generally assumed to be a perfect communications vehicle. DoD appears to operate on the precept that any qualified bidder can readily comprehend the technical documents presented to him, and with equal facility can readily produce the item without a specified schedule timeframe. When problems develop, but are undetected by the contractor, the DoD QAR, not having been involved during development, is not equipped to provide the assistance required or even notify the contractor that a problem has arisen.

Evidence of technical data deficiencies has been shown by formal reviews, many contract board appeals cases, the numbers of change orders issued. Recently a review of Army contract appeal cases over a one year period showed that 85% [Ref. 3] involved technical data problems such as a conflict in technical requirements, impossibility to meet requirements, or missing data. A review of technical data packages released for competitive procurements revealed similar technical deficiencies. For example, in one package containing 1200 drawings, 195 mandatory engineering changes were required to eliminate deficiencies [Ref. 3]. These technical data problems can be classified into three general groups. They are as follows:

1. Craftsman Errors

2. Engineering Deficiencies

3. Improper Use of Technical Data

These categories are identified in Table I reproduced from Ref. 1.

Improving the quality of technical data requires specific actions similar to controlling the quality of hardware. The contractor should be required to establish quality control procedures to measure and control the accuracy and adequacy of technical data in the preparation of the RFP. The role of the government contract administration representative should be that of review and approval of the contractor's system rather than that of approving the individual documents. The current practice requires almost all documents to be submitted to the government for approval. For example, in Shipbuilding this leads to an enormous workload for the Supervisor of Shipbuilding (SUPSHIPS) which is very expensive in terms of personnel. The elimination of this concept would not only give the Supervisor of Shipbuilding more time to administer government contracts but would lead to improved data packages since review would be on the exception basis and correction required in unsatisfactory procedures rather than in the individual data elements. In the past few years several attempts have been made to develop a military specification or standard to prescribe the quality controls contractors must maintain to assure accuracy and technical adequacy of the technical data presented to DoD under the terms of the contract, but these efforts failed when the services and DSA were unable to agree on a final document. Prior to implementing

TABLE I -- TECHNICAL DATA DEFICIENCIES

CLASS	EVIDENCE	CAUSE
A. CRAFTSMANSHIP ERRORS		CONTRACTOR
Illegible or missing data	ACO and PCO Reviews	Poor drafting practices
Obvious conflicts in requirements		No QC
Contract clause improper		GOVERNMENT
Packaging or marking requirements omitted (type II changes)		No QA
B. ENGINEERING DEFICIENCIES		CONTRACTOR
Processes & assembly data omitted	Industry complaint	Same as above
Inadequate performance requirements	Contract Board of Appeals	Poor configuration control
Improper Test Specifications	Technical Data review	GOVERNMENT
Parts or Subassembly interference		No QA
Wrong part specified		FACI
Changes not incorporated (type I changes)		
C. IMPROPER USE OF TECH DATA		
Transfer of Industrial technology	Same as above	Unnatural use of data
Data not suited for competition		

Source: 1968 DoD Contract Management Conference IMPACT -- 73 [Ref. 3]

procedures for improving the quality of technical data, it is essential for the Service and DSA to agree on a standard for the control of technical data.

C. SMALL BUSINESS PROGRAM

The Department of Defense is firmly committed to implementing the Small Business Act in defense procurement. Proposed procurements are reviewed for Small Business participation to the maximum extent possible and where it is impractical DoD requires the Prime Contractor to maintain a Small Business Program.

Small Business firms have proved that they can successfully submit bids and win contracts in areas in which they are competent. The difficulty is in the lack of familiarity with Government procurement, including subcontracting and the need for help and assistance of both the Government and the prime contractor in securing contracts and performing their work. This is particularly applicable to reliability and quality control programs where Government requirements are more stringent than commercial standards.

Quality assurance, technical, and procurement personnel must recognize this problem and plan to commit the resources and personnel necessary to assist Small Business firms in producing acceptable products for the Government. The necessity for committing these resources is an exception to government policy but it is necessary to ensure the success of the Small Business Program.

D. PUBLIC LAW 92-156

Section 506 of Public Law 92-156 [Ref. 18] enacted November 17, 1971 requires "report data on operational testing and evaluation for each weapon system for which funds for procurement are requested" commencing January 1, 1973. A supplemental report to Congress is required between thirty and sixty days prior to the award of a contract or exercising an option within a contract. The primary effect of Public Law 92-156 is to require accomplishment of Initial Operational Test and Evaluation (IOT&E) prior to the major production decision point to permit assessment of the operational effectiveness and suitability of a weapon system.

The Navy (COMOPTEVFOR) is currently developing procedures for implementing the requirements of PL 92-156. Although these procedures will affect developmental schedules, the goal is to improve reliability, maintainability, supportability, and operability elements of the system prior to commencing full scale development.

E. WARRANTIES AND THE INSPECTION CLAUSE

Although warranties have a considerable impact on proposed procurements, the Project Manager probably is not aware that in specifying either MIL-I-45208A or MIL-Q-9858A for quality requirements, that in effect the implementing ASPR clause abdicates any expressed warranty. Department of Defense policy requires contractors to control product quality and to offer to the Government, for acceptance, only those supplies

and services that conform to contractual requirements and, when required, for maintaining and furnishing substantiating evidence of this conformance. Thus determination that materials, data, supplies, and services meet requirements for acceptance is sometimes based on objective evidence furnished by the contractor by procedures approved by the QAR. The crux of the problem lies in the acceptance of the supplies delivered in accordance with the approved system that subsequently are discovered to be defective. In the absence of the Inspection clause the Government requires contractors to correct or replace defective supplies. The Inspection clause [Ref. 2] covers the Government's rights to inspect, to reject, to require correction of defects, to accept items at a reduction in price and after making the provisions relative to inspection continues:

> The inspection and test by the government of any supplies or lots thereof does not relieve the contractor from any responsibility regarding defects or other failures to meet the contract requirements which may be discovered prior to acceptance. Except as otherwise provided in this contract, acceptance shall be conclusive except as regards latent defects, fraud, or such gross mistakes as amount to fraud.

Furthermore ASPR 14-306 (b) [Ref. 2] provides that when inspection is at origin, supplies may not be reinspected at destination for acceptance purposes, rather they are to be examined only for identity, damage in transit, quantity and condition. Normally acceptance is evidenced by the execution of an acceptance certificate on the applicable inspection and receiving report form (DD Form 250, 1155, or Standard Form 44). Thus in the "Allison Honer Co." case the Armed Services Board of Contract Appeal (ASBCA) held that "in the absence of latent defects, fraud, or

gross mistake, acceptance of work per formal written certificate and final payment precluded the government from claiming the value of disputed work which the contractor did not perform." [Ref. 16]

In ASBCA 9934 involving the Republic Aviation Corporation, the Board of Contract Appeals ruled that oral expressed warranties given by the contractor did not survive acceptance. Although the ASPR inspection clause was included in the contract, the Government contended that implied warranty survived acceptance. In making this determination the Board ruled that:

> There is no contention that a latent defect, fraud or gross mistake amounting to fraud are involved here. Acceptance was conclusive, therefore, unless it was 'otherwise provided in this contract'. There is not written warranty or any other provision in the contract which provides 'otherwise'. The Government does not refer to the contract specification regarding prevention of chafing but these are not warranties which survive acceptance. Oral warranties outside the contract likewise are not covered by the exception. [Ref. 22]

This case emphasized the point that express warranties do not survive acceptance because they are not provided for or written in the contract.

One method of remedy for the deficiencies in the Inspection clause is through the inclusion of the Warranty of Supplies clause found in ASPR 1-324.7 (d) [Ref. 2]. This clause provides that "Notwithstanding inspection and acceptance" the contractor warrants the supplies will be free from defects in materials and workmanship and will conform to contract specifications. The remedies provided for breach of this express warrenty survive inspection and acceptance by the Government. In considering the Warranty clause for inclusion in a contract, the Project

Manager and the Procurement Contracting Officer must follow the ASPR Guidelines which requires an affirmative determination that the potential increase in contract price is outweighed by the benefits obtained for the Government.

The Inspection Clause which was adequate when DoD performed the inspection is not appropriate for current Department of Defense policy of placing responsibility for quality on its contractors because government acceptance relieves contractors of this responsibility. References 3 and 10 recommend updating the quality assurance clauses to reflect the meaning to the contractors' responsibility concept, i.e., reducing the finality of acceptance. The current inspection clause has remained unchanged for over twenty years and no longer is appropriate for current Department of Defense policy.

VII. THE IMPLICATION OF QUALITY ASSURANCE POLICIES AND PROCEDURES FOR PROJECT MANAGERS

Department of Defense policy toward project management is to assign a single individual (Project Manager) the responsibility and authority for accomplishing recognized program objectives in the development and production of major Weapon Systems. The concept is to provide centralized management authority over all of the technical and business aspects of the program.

The early conceptual effort is perhaps the most important stage to the Project Manager for project success. Decisions made here are not easily reversed or corrected in production. The Project Manager should seek the advice of lawyers, contracting officers, and technical experts in the development of an Acquisition and Management plan.

Although Ref. 21 allows NAVPRO/SUPSHIPS personnel to participate in the precontract award phases of the RFP preparation the Project Manager should establish direct liaison with appropriate elements in the NAVPRO/SUPSHIPS/DCAS activity at the prime contractor's plant. Reference 21 specifies that "agreements shall be reached between responsible Headquarters elements and applicable NAVPRO/SUPSHIPS authorities with respect to the responsibility of each relative to specific acquisition programs." The advantage of reaching an early agreement is that the contract administration activity will have more time to engage and monitor the contractor's activities. This information can be used to supplement

information presented by the contractor pursuant to contractual clauses. When problems occur, the contract administration office can request assistance from headquarters whose personnel have more expertise. The benefits can best be viewed from the experience at NAVPRO, Sunnyvale, where engagement has been the rule rather than the exception. Government personnel are well informed on the contractor's progress which allows the Project Manager to make better program decisions. The resultant clear assignment of responsibility allows potential problems to be identified and solutions obtained earlier during the developmental and production cycle than in other comparable projects without as much engagement. This is one of the reasons for the phenomenal success of the quality assurance program in the Polaris and Poseidon programs and it is a solution that does not require large amounts of product assurance dollars. The objective of the Project Manager is to get perscnnel from the contract administration agency to act on his team as well as specialists from headquarter activities to ensure the success of his project. Another technique that the Project Manager can use to accomplish this purpose is to assign a technical representative to the cognizant Contract Administration Office.

Department of Defense Instruction 4105.64, Technical Representation at Contractors' Facilities [Ref. 5], contains DoD policies concerning attachment of technical representatives (Tech Reps) to DoD Contract Administration offices by other DoD components. In general the Project Manager may exercise technical direction and control of a program at a contractor's plant through the following methods:

(1) Plant cognizance may be assigned on the basis of his program as in the Polaris/Poseidon Program, or

(2) The Project Manager may rely on the cognizant Contract Administration Office to meet his requirements, i.e., the Project Manager can delegate technical authority to the Contract Administration Office, or

(3) The Project Manager may assign Tech Reps to the Contract Administration Office.

To the maximum extent possible DoD policy requires the Project Manager to delegate his technical functions requiring performance at the Contractor's plant to the cognizant Contract Administration agency. However, if the Project Manager determines that the technical requirements cannot be satisfied by relying on Contract Administration Service components, the Project Manager may attach Tech Reps to the Contract Administration Office to perform their own technical functions, to perform liaison, and to provide guidance and assistance to the Contract Administration Office. The key to success is the recognition that the Project Manager must rely on the Contract Administration Office to administer his contract. By considering this problem early in the conceptual stages of the project, it is possible for the Project Manager and the Contract Administration Office to reach an agreement concerning level of efforts and responsibilities of each relative to specific acquisition programs. The importance of the Contract Administration agency is emphasized by

its role in acting "as the authoritative interface with the contractors on all matters affecting performance on existing or proposed contracts." [Ref. 21]

VIII. CONCLUSIONS AND RECOMMENDATIONS

A. POLICY

Department of Defense Directive 4155.1 (ASD (I&L)), "Quality Assurance," issued on 9 February 1972 cancelled twelve coexisting DoD Instructions. In addition to consolidating DoD quality assurance policy, the principle for establishing effective policies through consistency was followed. The real significance of this directive may be in marking the maturation of quality assurance as a prime discipline within headquarter activities. The clarification of quality assurance policies enables Project Managers responsible for implementing quality assurance provisions to function more effectively.

B. CONTRACT ADMINISTRATION

1. General

The Project Manager is vitally interested in the contract requirements and the means of administration. Once the contract is definitized the contract administration office cognizant at the contractor's plant acts as the Project Manager's agent in all matters relating to performance under the existing contract. To achieve maximum effectiveness, the Project Manager should demand contract administration personnel participation in the precontract award phase, evaluation and source selection. Often information presented by contract administration personnel is vital in obtaining the best contract terms for the proposed contract. The

interest generated by this participation will carry over into the administration phase and will aid the Project Manager in discharging his responsibilities toward the contract.

2. Transfer Fund or Improved Vendor Control Concepts

The Transfer Fund or Improved Vendor Control concepts would improve the subcontract administration problem and bear further consideration for future implementation. The advantage of Transfer Payments is in better accounting of System costs particularly for those dollars spent in product assurance. The advantage of the industry proposal is in possible savings for industry and Government.

3. Standardized Procedures

Although quality assurance policy has been standardized, contract administration procedures have not. The acceptance of a common procedural manual, DSA 8200.1, Series, would be a tremendous improvement and would allow for more effective and beneficial audits of contract administration activities.

C. CROSS TRAINING

Section V.A. of this paper discusses the importance of the technical/contract personnel interface in system procurement. One method of improving this interface is to establish cross training courses similar to the Harbridge House, Defense Procurement Management for Technical Personnel course to communicate the difficulties inherent in contracting and to give the various participants an understanding of the problems

and pressures faced by the other members of the procurement team.

D. NEED FOR QA REEAXMINED

Because the Government accounting system does not lend itself to allocating full costs to individual projects, it is doubtful that any one person, much less the Project Manager, knows the full impact of a particular decision. Full accounting is necessary to wisely evaluate the alternatives of quality assurance decisions. Although a Project Manager may know relative magnitudes of costs associated with different quality assurance requirements, the full costs are hidden within the Defense Budget. The great benefits claimed to result from the application of quality assurance procedures and techniques to Weapon System Procurement sound very similar to claims made by proponents of Value Engineering or Should Cost Pricing techniques, yet the United States Government pays for our systems several times over in terms of what the Soviets or our European allies pay for similar systems. The real question that needs to be asked not only by the Project Manager, but by the ASD (I&L) and even by Congress is as follows: Are we getting benefits commensurate with product assurance dollars? If not, the entire Weapon System concept at least in relation to quality assurance should be reexamined and simplified without losing system effectiveness. Although this paper does not address this issue, the question is one that is particularly appropriate in the light of expected budgetary pressures.

E. PROJECT MANAGERS

In planning his program the Project Manager needs to take a close look at the impact and need for and degree of quality assurance in his program. This requires an understanding not only of the basic DoD policies but also of the basic procedures by which these policies are implemented. The most important aspect of quality assurance is for the personnel within the cognizant contract administration office to engage their counterparts within the contractor's organization in order to identify and ensure solutions for problems when they arise rather than when the problem causes program delay or increases program cost that cannot be contained within the firm.

One point the Project Manager must keep foremost in his mind is that quality assurance consists of those actions designed to provide confidence that materials conform to specified technical requirements and will provide optimal effectivity in the hands of the users. If the product as delivered fails to do this, the Project Manager has failed to perform his job properly. The inclusion of Quality Assurance specialists as participants in the early design and conceptual phases of a program can help in defining the technical requirements including the optimization of designs and processes.

APPENDIX A

February 9, 1972
NUMBER 4155.1

ASD(I&L)

Department of Defense Directive

SUBJECT Quality Assurance

Refs.: (a) DoD Manual 1430.10-M-2, "DoD-Wide Civilian Career Program for Quality and Reliability Assurance Personnel," February 3, 1970, authorized by DoD Instruction 1430.10, June 2, 1966
(b) DoD Directive 4120.3, "Defense Standardization Program," April 23, 1965
(c) DoD Instruction 4115.1, "DoD Coordinated Procurement Program - Purchase Assignments," October 14, 1968
(d) DoD Directive 5160.51, "Precise Time and Time Interval (PTTI) Standards and Calibration Facilities for Use by DoD Components," August 31, 1971
(e) DoD 4155.12-H, "A Guide to Zero Defects," November 1, 1965, authorized herein
(f) DoD 4105.59-H, "DoD Directory of Contract Administration Services Components," authorized by reference (h)
(g) Armed Services Procurement Regulation, established by DoD Directive 4105.30, March 11, 1959
(h) DoD Instruction 4105.59, "DoD Plant Cognizance Program," August 20, 1970
(i) DoD Directive 5000.19, "Policies for the Management and Control of DoD Information Requirements," June 2, 1971
(k) through (v) cancelled hereby and listed in enclosure 1

I. PURPOSE

This Directive establishes Department of Defense quality assurance policies designed to assure that all materiel, data, supplies and services developed, procured, produced, stored, operated, maintained, overhauled, or disposed of by or for the DoD meet the following objectives.

A. that materiel, data, supplies and services conform to specified requirements;

B. that specified requirements for materiel, data, supplies and services are practical and enforceable; and

C. that user dissatisfaction and mission ineffectiveness are prevented and/or eliminated.

II. CANCELLATION

Reference (j) will be cancelled one year after the effective date of this Directive. References (k) through (v) are hereby cancelled.

III. APPLICABILITY

The provisions of this Directive apply to the Military Departments, the Defense Supply Agency, the National Security Agency and the Defense Communications Agency (hereafter referred to collectively as "DoD Components").

IV. DEFINITIONS

Terms used in this Directive are defined in enclosure 2.

V. RESPONSIBILITIES

A. The Assistant Secretary of Defense (Installations and Logistic) shall provide overall policy guidance on DoD quality assuranc .

B. Each DoD Component shall designate a central management focal point to be responsible for directing and monitoring quality assurance policy compliance with the provisions of this Directive.

C. There is hereby established a DoD Quality Assurance Council composed of one General or Flag rank officer and one senior civilian from each of the Military Departments and the Defense Supply Agency (DSA). The Council shall be chaired by a representative of the ASD(I&L) and will provide consultation and advice to the ASD(I&L) on quality assurance matters. The DoD Quality and Reliability Assurance Career Management Board (see DoD Manual 1430.10-M-2; reference (a)) shall be a subgroup of the Council.

D. DoD Components shall, within the provisions of the Defense Standardization Program as outlined in DoD Directive 4120.3 (reference (b)), assure that all specifications and standards intended for implementation of the policies contained herein are fully coordinated.

E. DoD-Wide Integrated Commodity Managers assigned responsibility under DoD Instruction 4115.1 (reference (c)) in collaboration with the Military Departments and DSA, shall develop, establish and issue uniform procedures to be utilized in conducting government procurement quality assurance (see VII.B.2., below) as appropriate.

F. The Joint Logistics Commanders through the existing Joint Technical Coordinating Group for Metrology and Calibration (JTCG-METCAL) shall provide for interservice coordination of the DoD Calibration and Metrology Program. Its principal subgroup, the Calibration Coordination Group (CCG), shall be the DoD point of contact with the National Bureau of Standards on DoD requirements for calibration, and calibration engineering services (e.g., requirements involving new equipment and techniques, improved accuracies, expanded ranges), see encl. 3.

VI. CONCEPTS

A. The primary purpose of quality assurance is the enforcement of technical criteria and requirements governing all materiel, data, supplies and services developed, procured, produced, stored, operated, maintained, overhauled or disposed of by or for the DoD.

B. Functional organizations creating technical criteria are responsible for translation of functional requirements including reliability and maintainability into quantitative requirements that can be contractually specified with appropriate demonstration.

C. Continued review of technical criteria to insure against errors and omissions is an essential element of quality assurance.

D. The quality of design of an end product may, in part, be assessed on the basis of reviewing experience gained with the various components that contribute to the design.

E. Functional test of the end product in a real or simulated environment is required where feasible to confirm that performance requirements, including quality, are met.

VII. POLICY

A. GENERAL

1. Determination that materiel, data, supplies and services meet requirements shall be based on objective evidence, including the results of direct product examination and test, review of procedures, processes, records and documentation. The results shall be documented to support the planning of corrective action and other management activity.

2. The degree and type of quality assurance provided during the life of a product (from Development through Disposal) shall be optimally varied to assure mission responsiveness.

3. Defect prevention shall be fostered by:

   a. timely and integrated planning of needed quality assurance;

   b. monitoring of appropriate procedures, systems and resources; and

   c. correction of causes of deficiencies.

4. There shall be a system, or systems, that will feed back quality information to activities responsible for development, procurement and other management functions so that action can be initiated to correct/prevent quality deficiencies. The Military Departments and DSA shall ensure unsatisfactory material quality conditions are reported by using activities within their own logistics systems and across DoD Component lines as appropriate. DSA, in collaboration with the Military Departments shall develop a joint regulation covering procedures and format for reporting quality data across DoD Component lines. Information and reporting requirements will be developed consistent with the policies prescribed in reference (i).

Continuation of VII. A.

5. DoD Components shall comply with the DoD-Wide Civilian Career Program for Quality and Reliability Assurance Personnel (DoD Manual 1430.10-M-2 (reference (a)) to assure maximum employee efficiency and career growth.

6. Quality audits of materiel, data, supplies and services shall be conducted.

7. Adequate and economical metrology and calibration services shall be established in support of test, measuring and diagnostic equipment used throughout the materiel life cycle. Measurement accuracies shall be traceable to U. S. National Standards maintained by the National Bureau of Standards and/or to fundamental physical constants (see V. F. above) and the referral of time and time interval measurements to "time standards" established by the U. S. Naval Observatory under the provisions of DoD Directive 5160.51 (reference (d)).

8. The institution and continuation of Zero Defects type programs shall be voluntary for both contractors and DoD Components. Handbook 4155.12H, "A Guide to Zero Defects" (reference (e)) is authorized for use as a guide.

B. PROCUREMENT

1. Contractors are responsible for (a) controlling product quality, (b) offering to the government for acceptance only materiel, data, supplies and services that conform to contract requirements, and (c) when required, maintaining and furnishing substantiating evidence of this conformance.

2. DoD Components in accordance with assigned responsibilities shall:

   a. assure that contracts specify appropriate quality requirements; and that contractors comply with quality requirements;

   b. comply with DoD 4105.59-H (reference (f)) in assigning responsibilities for quality assurance administration of contracts.

3. Government procurement quality assurance actions performed at the subcontract level are performed solely to assist contract administration offices in accomplishing their responsibilities. Such actions shall not relieve the contractor of any of his responsibilities under the contract and shall not establish any contractual relationship between the government and the subcontractors.

4. Contractor quality history data shall be maintained and used as applicable by DoD Components.

5. The quality assurance policy contained in B. above shall be implemented by Armed Services Procurement Regulation (ASPR) (reference (g)).

C. DEVELOPMENT

1. Quality assurance shall be provided for early in design and development. The development function shall include assessment of the quality requirements in relation to cost, schedule and performance parameters.

2. Prior to completion of development all specifications, standards, inspections, tests and evaluations required to insure against degradation of performance during the production process shall be identified or developed.

3. Calibration requirements for newly developed materiel which necessitates technical advances in the development of measuring and test equipment, measuring standards, or state-of-the-art techniques, shall be identified and programmed early in development.

D. IN-HOUSE ACTIVITIES

1. Supply and Storage. DoD Components responsible for receiving, storing and issuing supplies will develop and implement quality assurance, including inspection (for both new and returned materiels) for identification, condition, completeness, preservation, packaging, and marking. Materiel in storage will be inspected on a planned, cyclic, surveillance basis in accordance with the needs of the commodities managed and standards

prescribed by the materiel managers. Testing will be performed by government laboratories to the optimum extent with arrangements made for commercial testing only as necessary.

2. Maintenance. DoD Components are responsible for providing quality assurance monitoring of in-house maintenance functions at all maintenance levels. Conversion, modification, overhaul, repair and alteration of materiel shall be subjected to quality assurance to insure conformance to requirements.

3. Operations. DoD Components are responsible for maintaining the quality of performance and readiness of equipment in their possession. This responsibility includes organizing, training, equipping and providing such quality assurance services as are necessary to assure materiel readiness.

4. Manufacturing. DoD Components operating manufacturing activities will assure that management action is taken to plan and develop effective and economical quality assurance for material produced. Quality assurance shall extend throughout design, development, fabrication, processing, assembly, installation, packagir , packing and shipping. The quality assurance shall be compatible with the engineering and tooling needs of production and the related design.

E. CROSS SERVICING AND FOREIGN SUPPORT

1. Interservice. DoD Instruction 4105.59 (reference (h)) requires that DoD Contract Administration Services Components support without charge all DoD organizations in quality assurance and related functional areas.

2. Foreign and Non-DoD Organizations. Agreements for the acquisition of supplies and services entered into by the DoD Components with Foreign Governments and International Organizations shall provide for quality assurance in consonance with the policies stated herein. Regulations and procedures concerning quality assurance support provided to, or obtained from, non-DoD organizations,

foreign governments, and international organizations, are contained in Section 14, Part 6 and Section 20, Part 5 and Part 6 of reference (g).

VIII. EFFECTIVE DATE AND IMPLEMENTATION

A. This Directive is effective immediately. DoD Components shall take immediate action to implement this Directive and forward two copies of each implementing document to the Assistant Secretary of Defense (Installations and Logistics) within 60 days.

B. Within one year, the Director, Defense Supply Agency, in coordination with the Military Departments, will develop a joint procedural document in compliance with the policies outlined in VII.A.4., above. All joint procedural documents for implementing the policies stated herein will be approved by the Assistant Secretary of Defense (Installations and Logistics) prior to publication.

Secretary of Defense

Enclosures - 3
1. Refs. (j) thru (v)
2. Definitions
3. Memo of Understanding

REFERENCES Continued

(j) DoD Instruction 7700.12, "Reporting Unsatisfactory Newly Procured and Contractor Maintained Materiel," November 27, 1968 (to be cancelled, see Section II, herein)
(k) DoD Instruction 4155.2, "Government Procurement Quality Assurance and Quality Surveillance of Petroleum," February 27, 1967 (hereby cancelled)
(l) DoD Instruction 4155.9, "DoD Policy for Government Inspection of Subcontracted Supplies," December 31, 1957 (hereby cancelled)
(m) DoD Instruction 4155.10, "DoD Policies and Procedures for Assuring Quality of Production of Complex Supplies and Equipment," February 10, 1959 (hereby cancelled)
(n) DoD Directive 4155.11, "Improved Management for Quality and Reliability Assurance of Materiel," June 17, 1965 (hereby cancelled)
(o) DoD Instruction 4155.12, "DoD Zero Defects Program," April 14, 1969 (hereby cancelled)
(p) DoD Instruction 4155.13, "Quality Control and Reliability Management at Supply and Storage Deport," November 27, 1967 (hereby cancelled)
(q) DoD Instruction 4155.14, "NATO Standardization Agreement (STANAG) 4107 Mutual Acceptance of Government Quality Assurance," December 11, 1967 (hereby cancelled) 1/
(r) DoD Instruction 4155.15, "Quality and Reliability Assurance Depot Maintenance Activities," March 20, 1968 (hereby cancelled)
(s) DoD Instruction 4155.16, "Processing Requests from Foreign Governments or International Organizations for Inspection of Direct Procurement," April 8, 1968 (hereby cancelled)
(t) DoD Instruction 4155.17, "NATO Standardization Agreement (STANAG) 4108 'NATO Quality Control System Requirements for Industry'," August 19, 1968 (hereby cancelled) 1/
(u) DoD Directive 4155.18, "Improved Management of Metrology and Calibration Programs," March 22, 1969 (hereby cancelled) 2/
(v) ASD(I&L) Memorandum, "Establishment of DoD Quality and Reliability Assurance Council," 15 August 1964 (cancelled herein)

1/ STANAG Agreements now implemented in ASPR. (see VII.E.2., of basic Directive).

2/ Memorandum of Understanding remains in effect (see enclosure 3 attached hereto)

DEFINITIONS

A. Quality - The composite of materiel attributes including performance.

B. Quality Assurance - A planned and systematic pattern of all actions necessary to provide adequate confidence that materiel, data, supplies and services conforms to established technical requirements and achieves satisfactory performance.

C. Metrology - The science of measurement for determination of conformance to technical requirements including the development of standards and systems for absolute and relative measurements.

D. Calibration - Comparison of a standard or measuring equipment instrument with a standard of higher accuracy to insure that the former is within specified limits throughout its entire range.

August 22, 1968

MEMORANDUM OF UNDERSTANDING

SUBJECT: Procedure for Determining, Estimating the Cost of and Arranging for the Radio and Electronic Calibration Services that Department of Defense Activities Obtain from the National Bureau of Standards

1. General

This memorandum establishes an agreement between the Department of Defense (DDR&E-ASD(I&L)) and the Department of Commerce (National Bureau of Standards) regarding calibration requirements and services pertaining to radio and electronic standards except for Time and Time Interval Standards covered by DoD Directive 5160.51.

2. Purpose

The purpose of this agreement is to establish a uniform procedure for: (a) determining DoD requirements for calibration and calibration engineering services; (b) a joint DoD/NBS review of these requirements to identify those services NBS can provide and to estimate their cost; and (c) planning to budget and fund the estimated cost of the services that by mutual agreement are to be provided by NBS.

3. Basis for Agreement

(a) The services and facilities of the National Bureau of Standards in radio and electronic standards are essential for the support of DoD operations.

(b) An effective NBS/DoD relationship requires a continuing exchange of information regarding requirements, capabilities, and costs.

4. Procedures

(a) A DoD Calibration Coordination Group (DoD/CCG) consisting of representatives from the Military Departments and DSA will be the DoD

point of contact with NBS on all DoD requirements for calibration and calibration engineering services.

(b) A similar point of contact established by NBS, the Office of the Director, Institute for Basic Standards, will make the arrangements for providing the services pertaining to the calibration and calibration engineering requirements as mutually agreed with the DoD/CCG.

(c) DoD calibration requirements shall be assembled each year by the DoD/CCG to provide the following information as a minimum:

(i) Quantitative calibration requirements for the following two fiscal years; and

(ii) Calibration engineering requirements (e. g., requirements involving new equipment and techniques, improved accuracies, or expanded ranges) that have developed or are expected to develop during this two year period plus three additional years.

(d) NBS will use the information on DoD calibration requirements assembled by the DoD/CCG to:

(i) Estimate the charge to DoD in terms of a fee or an hourly rate for each calibration requirement, these fees or hourly rates to be the same for the DoD as for the public; and

(ii) Identify those calibration engineering requirements that can be accomplished by projects initiated with funds available to NBS and those that will require funding by the DoD.

5. Time Cycles

(a) The DoD/CCG will assemble and submit to the Director, NBS, on or before 1 September of each year a preliminary schedule of

requirements that describe (i) DoD calibration requirements for the next two fiscal years (ii) DoD calibration engineering requirements for this two year period and the following three fiscal years.

(b) The Director, IBS, will review the schedule of DoD requirements and prepare a cost estimate before 15 November.

(c) A final schedule of requirements will be prepared by the DoD/CCG in cooperation with the Director, NBS by 1 January. The DoD will plan to budget and fund the estimated cost of the requirements that have been mutually agreed upon between the DoD/CCG and NBS. NBS will plan to provide a calibration and supporting services program to meet these requirements.

(d) Prior to 1 July, each of the Military Departments will submit to NBS a formal work order. The Military Departments will transfer advance funds to NBS at the earliest time possible.

(e) For workloads in addition to those already covered by work orders, NBS will charge the Military Departments the same fees or hourly rates as are charged to the public. Such additional workloads can be covered either by amendment of the original work orders or by new work orders.

(f) To facilitate transition to the above described procedure, the DoD will plan to provide for funded work requested during FY 68 and FY 69 at a level at least equal to the level of funding for calibration services in FY 67, subject to the availability of funds.

6. Revisions

This agreement may be reviewed at the request of the DoD or the NBS and revised as mutually agreed between the two agencies.

Concurrence _____ Date 19 Jan 1968
Allen V. Astin, Director, National Bureau of Standards

Concurrence _____ Date 14 August 1968
Assistant Secretary of Defense (Installations and Logistics)

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ABSTRACT

The purpose of this paper is to examine DoD quality assurance policies and their application to Weapon System Acquisition Management. This paper is divided into six sections -- Elements of Policy, DoD Quality Assurance Policy, Quality Assurance During System Procurement, Areas Needing Improvement, Project Management, and Conclusions and Recommendations.

In general, quality assurance policies are consistent and well defined, but the procedures for implementing these policies need revision in the area of subcontract administration. Particular problems include the lack of standardized procedures for use by the Military Departments and DCAS, and the inability of contract administration offices at subcontract facilities to perform surveillance because of insufficient personnel.

The major deficiency in quality assurance procedures involves the Inspection Clause in ASPR which makes acceptance at the source final. The clause is not appropriate for current DoD policy of placing responsibility for quality on its contractors because government acceptance relieves the contractor of this responsibility.

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